An Overview of the Strategic Highway Research Program

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ABSTRACT

In the last few years there has been concern by top leaders in the transportation community about the exceedingly low level and declining effort devoted to transportation research. It has been segmented, often uncoordinated, and localized in nature. As a result there was a need to reassess the nature and the level of effort of transportation research, especially research devoted to preserving and enhancing public investments in highways. With the U.S. interstate system virtually in place, attention in the last few years has shifted sharply to reconstruction, rehabilitation and maintenance. Focus has turned toward cost-effective measures for preserving and maintaining highway facilities.

Under the sponsorship of the Federal Highway Administration (FHWA), the Transportation Research Board (TRB) conducted a study to assess the status of highway research, the reasons for its reduction, and to recommend a strategy for improvement. The results of this are contained in the report entitled *America's Highways, Accelerating the Search for Innovation*, published by TRB as Special Report 202. This report described recent trends in highway research, set out criteria for setting research priorities, recommended a national highway research program based on those criteria, and discussed options for organizations to manage the overall effort.

The report recommended a Strategic Highway Research Program with special emphasis on six high payoff research areas: studies of asphalt materials, long term pavement performance, maintenance cost-effectiveness, bridge concrete protection systems, cement and concrete characteristics, and chemical control of snow and ice. A highly focused five-year, $150 million research program in these six areas was proposed. The pavement performance study would continue for an additional 15 years at a budget of $10 million per year.

THE DEVELOPMENT OF THE STRATEGIC HIGHWAY RESEARCH PROGRAM (SHRP)

The States and the FHWA have had key roles in the development of SHRP. The States endorsed and adopted the recommendations for a major new 5-year research program. They showed their support for proposed new legislation that would fund the program and funded the SHRP pre-implementation activities which began in October 1984. Included were the planning processes necessary to set up a management organization to run SHRP, assembling a Task Force to provide overall guidance and direction to the pre-implementation activities, plus forming technical advisory committees and selecting contractor agencies to develop the detailed research plan in each of the six technical areas of the program.

The roles of the committees were to provide input and guidance into the development of the detailed research plan. There were more than 200 individuals on the advisory committees and they represented a broad spectrum of backgrounds and opinions. The active participation by these many individuals has been a real plus to SHRP.

In addition to the intense committee activity a National Workshop was held in September 1985. This meeting drew together nearly 500 people interested in highway research for a 3-day meeting to provide comments and suggestions for the refinement of the research plans that had been developed to date. Many good ideas and improvements to the plan surfaced at the Workshop and were incorporated into the final research plan in each technical area.

In early 1986 final reports were submitted by each SHRP contractor after review by the appropriate technical advisory committee and the combined plan was published by TRB in April 1986.

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SUMMARY OF SHRP RESEARCH DESIGN

ASPHALT CHARACTERISTICS

The Problem

A fundamental and widely used material in highway construction and maintenance is asphalt. Highway agencies spend $10 billion per year on asphalt pavements. Recent years have witnessed increasing numbers of larger and heavier trucks plying the highways. There have been growing demands upon pavement durability, and more pavement failures have been occurring. Some of the physical specifications and tests used to classify asphalt and ensure quality control are more than 70 years old, and need to be reassessed in terms of today's requirements and current technology.

Objectives

The asphalt research aims to improve pavement performance through increased understanding of the chemical and physical properties of asphalt cements and asphalt concretes. The research results could be used to develop specifications, tests, and construction procedures needed to achieve and control pavement performance. SHRP proposes to achieve an understanding of how the properties of asphalt relate to performance, and to develop performance specifications for significantly improved asphalt and asphalt-aggregate mixtures. The asphalt research program proposes that work be done under five major research projects costing $50 million over 5 years:

1-1	Asphalt properties	$22,000,000
1.2	Performance based testing and measuring systems	15,000,000
1-3	Pavement performance models	4,500,000
1.4	Performance based specifications	5,500,000
1-5	Coordination	3,500,000

Project 1-1: Asphalt Properties: This project will address the fundamental aspects of chemical and physical properties, their interrelationships, and the interaction between asphalt and aggregate. The information will create an extensive data base needed to (1) relate asphalt chemical compositions and physical properties and pavement performance; (2) develop new test methods relevant to asphalt properties; (3) improve asphalt quality; (4) provide the criteria for the design and production of mixtures; (5) provide information for preparing performance based specifications; and (6) provide tools for diagnosing the role of asphalt in pavement performance.

Project 1-2: Performance Based Testing and Measuring Systems: This project will identify and develop standardized testing and measuring systems to define the chemical and physical properties of asphalts. Tests which correlate well with pavement performance and are useful for acceptance specifications will be identified.

Project 1-3: Pavement Performance Models: The primary objectives of this research project will be to develop asphalt pavement performance prediction models. Interrelationships between asphalt properties and asphaltic concrete mixture properties will be established. Models will be developed for three types of distress: (1) rutting, (2) fatigue cracking, and (3) low temperature cracking. Prediction models will be required to reflect the influence of the physiochemical properties of asphalt as well as the properties of the asphalt-aggregate system.

Project 1-4: Performance Based Specifications: The asphalt research program will culminate in the preparation of performance-based specifications for asphalt and recommendations for an asphalt-aggregate mixture analysis system using modified or unmodified asphalts.

Project 1-5: Coordination: Because of the magnitude of the asphalt research program, a separate project is planned to coordinate the different tasks; establish and operate a materials reference library; and assemble implementation packages suitable for user agencies in employing the research findings.

LONG-TERM PAVEMENT PERFORMANCE (LTPP)

The Problem

The U.S. will spend about $400 billion replacing and rehabilitating pavements before the end of the century. Despite these immense projected expenditures, no comprehensive research on long term pavement performance has been conducted since the accelerated AASHO Road Test a quarter of a century ago. The Long-Term Pavement Performance Program embraces the total range of pavement information needs. It seeks to develop models that will better explain how pavements perform. It also seeks to gain knowledge of the effects on pavement performance of various design features, traffic and environment, use of various materials, construction quality, and maintenance practices.

Objectives
The specific objectives developed for LTPP are: (1) evaluate existing design methods; (2) develop improved design methodologies and strategies for the rehabilitation of existing pavements; (3) develop improved design equations for new and reconstructed pavements; (4) determine the effects of: loading, environment, material properties and variability, construction quality, and maintenance levels on pavement distress and performance; (5) determine the effects of specific design features on pavement performance; and (6) establish a national long-term pavement data base to support SHRP objectives and future needs.

The LTPP Program
There are three potential types of studies. These include General Pavement Studies, Specific Pavement Studies, and Accelerated Pavement Testing. The General Pavement Studies involve a very large experiment that embraces a large array of factors, expected to produce a broad range of products and results. The Specific Pavement Studies will have their own set of more limited goals, construction needs, and experimental approaches; and are generally aimed at more intensive studies of a few independent variables for each of a number of study topics. The other category of studies, which is to be considered for future adoption, the Accelerated Pavement Testing Program, could include either road tests or an accelerated loading facility, which is currently under development by the FHWA and scheduled for availability in 1987. Both the General and Specific Pavement Studies are to be conducted on in-service pavements using only the normal traffic.

The five year budget for the long-term pavement performance study is $50 million, but the in-service pavement studies are planned for a total of 20 years and will require an additional $150 million.

General Pavement Studies
The primary goal is to structure an experiment, using primarily existing inservice pavement sections to develop a national data base needed to meet the objectives of LTPP. This is done by identifying major factors such as environment, pavement type, traffic, etc., and combining them into a factorial experiment. These factors are used in selecting test sections so that their effects on performance can be attained.

The first and most obvious factor considered is type of pavement. The number of pavement types is limited to the five "original pavement types" and the four rehabilitation techniques applied to specific pavement types. Each is considered to be an individual experiment, and a detailed experimental design was developed for each one.

The original pavements are: Asphalt Concrete over Granular Base and Stabilized Base, Jointed Plain, Jointed Reinforced, and Continuously Reinforced Concrete Pavements. The rehabilitated pavements are: Asphalt Concrete Overlays of Asphalt Concrete and Jointed PCC and Bonded and Unbonded Concrete Overlays.

The experimental design approach adopted is a tiered factorial approach. For each pavement type, the key factors of traffic, climate (moisture and temperature) and subgrade soil were selected in common for the primary tier factorial. Pavements located in any one of the primary tier cells have approximately the same traffic, climate and subgrade soil. These four factors basically describe the forces that act on a pavement structure in a given geographic location.

A secondary tier factorial experimental design is then set up in each primary tier cell by selecting the factors that are of greatest concern for that particular pavement type. The tiered approach was selected as it provides maximum flexibility for analyzing all or portions of the data, and thus will be responsive to the needs in a given geographic area.

Specific Pavement Studies
These are generally limited factorials for very intensive studies of the effects of a few factors. The highway sections will mostly be specially designed and constructed through a cooperative effort with interested States, frequently with the test sections collocated to ensure the same subgrade, climate, and traffic. However, some studies may utilize existing pavements.

Data Collection and Management
The data items recommended for collection are considered in two broad categories. The first is basic inventory data, which includes those items that remain constant over the monitoring period. The second is monitoring data, which includes those items that will change with time and will require periodic measurements or updating during the monitoring period.

The basic inventory data includes that data necessary to identify: (1) the test section, (2) the details of its construction and the material properties, (3) the environment, (4) past traffic and axle-load data, (5) previous maintenance and rehabilitation, and (6) construction and prior maintenance. This data should remain constant throughout the monitoring period unless the pavement is resurfaced or rehabilitated.

The monitoring data includes: (1) distress, serviceability, and roughness measurements; (2) traffic and axle load data; (3) skid testing; (4) deflection testing; and (5) identification of pavement maintenance and rehabilitation, and its costs.

State-of-the-art automated data collection will be applied. This is expected to include the following: (1) automated photographic collection of distress data; (2) some type of profilometer rather than a response-type roughness meter; (3) deflection measurement made with the falling weight deflectometer; and (4) equipment for automated vehicle classification, and axle weighing in motion.

Promising and much more economical weigh-in-motion systems using piezoelectric cables or capacitance strips are coming, and will be installed when available. Both automated vehicle classification and axle weight measurements will be made for each test section. This equipment will be operated by the states as part of their traffic monitoring activities.

MAINTENANCE COST-EFFECTIVENESS

The Problem
State and local highway maintenance expenditures throughout the U.S. total $15 billion annually. In addition there are other maintenance costs that have not been quantified in dollars, including the 500 maintenance workers killed each year in work-related accidents.

Objectives
This research plan addresses highway maintenance cost-effectiveness improvements by developing better information with which to manage resources, and by applying technological innovation to maintenance materials, equipment, and methods to increase productivity. The plan consists of the five projects costing $20 million over 5 years:

3-1	Maintenance effectiveness	$6,500,000
3.2	Instrumentation for evaluating pavement maintenance	3,500,000
3.3	Pavement patching and crack filling	6,300,000
3-4	Maintenance workzone safety systems	2,900,000
3-5	Training for maintenance workers	1,300,000

Project 3-1 concerns the need to understand maintenance treatment effectiveness in terms of pavement condition improvement and extended life. The study will be part of the long-term pavement performance study. This study will create a data base to evaluate the effectiveness of four flexible pavement maintenance treatments (chip seals, slurry seals, thin overlays and crack sealing) and two rigid pavement treatments (joint and crack sealing and under sealing). The project will generate a data base that includes environmental, traffic, pavement characterization, and performance data. The end product will be an understanding of the maintenance effectiveness of specific pavement treatments, plus a study guide to be used by highway agencies in evaluating other maintenance treatments.

Project 3-2 was created to help highway agencies evaluate pavement maintenance effectiveness. Maintenance practices vary widely from one agency to another. The six specific treatments being studied in Project 3-1 cover only a few of the many variations in treatments, conditions, and environments. There remains a need to understand the effectiveness of pavement treatments not studied.

This project focuses on the data collection problem by outlining a program to develop measuring methods and instrumentation to quantify pavement conditions and the factors that influence pavement performance. Faster, more accurate and automated data acquisition procedures are needed. The project will define measurement needs and identify equipment, instrumentation, or methods that can be used in the measurement process. The project will produce specifications for measurement processes plus standard measurement and data reduction procedures.

Project 3-3 will study the materials, equipment and procedures used in two prevalent pavement treatments: localized pavement surface repairs (essentially patching), and pavement joint and crack sealing for flexible and rigid pavements. The maintenance process can be made more cost-effective through the use of better materials, equipment and methods. This applies to both the maintenance activity and the traffic control procedures used to protect the motorist and worker during maintenance work. The project is expected to identify a number of new and innovative applications for existing materials and material combinations.

Project 3-4, on workzone systems, recognizes that major improvements in pavement activity productivity must be complemented with faster and more efficient procedures to install and remove traffic controls. This project will create objective procedures to evaluate both existing and newly developed devices and equipment. Emphasis is placed on developing better barriers, attenuaters, and warning systems to improve motorist and worker safety. The end products will include specifications on the new materials and devices, plus training guides on improved traffic control installation and removal procedures.

Project 3-5 deals with a fundamental concern of the maintenance community, i.e., getting research results used. New and innovative ways to implement research results are needed. Contemporary marketing technology will be examined in depth, and specialists in this technology will interact with the other maintenance activities. Together, they will produce a series of implementation units which will have been tested, evaluated, and modified to ensure their effectiveness in reaching the target constituencies.

BRIDGE COMPONENT DESIGN

The Problem

The principal cause of the rapid and premature deterioration of bridge decks is the use of salt in winter maintenance operations. The salt penetrates the concrete and causes corrosion of the embedded reinforcement. Once initiated, corrosion is extremely difficult to arrest. As the steel corrodes, it expands and develops stresses which eventually induce spalling of the concrete and result in the potholes familiar to the road user. It is not only bridge decks which have experienced the ravages of corrosion-induced distress. In those parts of the country where de-icing chemicals are used, chloride ions have penetrated beams, piers, and abutments which are exposed to surface runoff or spray from passing vehicles. Many concrete components in bridges located in a marine environment have also been penetrated by chloride ions and are exhibiting serious corrosion problems.

Objectives

The overall objectives are to provide methods to protect chloride-contaminated concrete components against deterioration and to rehabilitate and protect those components which are already exhibiting corrosion-induced distress.

The key question which must be answered by bridge owners is how and when to protect existing bridges against corrosion to minimize life-cycle costs. Consequently, the final goal will be the development of a decision model which is applicable at the project level and will lead to the most appropriate protective treatment for any structure under an agency's jurisdiction. The research plan and budget for Concrete Bridge Protection comprises four projects costing $10 million:

4-1	Inspection and assessment	$2,350,000
4-2	Protection and rehabilitation by electrochemical methods	3,525,000
4-3	Protection and rehabilitation by other than electrochemical methods	3,550,000
4-4	Protection and rehabilitation methodology	575,000

Project 4-1 will develop economic and reliable methods for the inspection and assessment of the existing condition and for predicting the future condition of concrete bridge components. In addition to developing products which can be used by bridge owners to obtain more reliable information on the condition of bridges, the products are also required for the successful completion of the other three projects. The measurement of the rate of corrosion of embedded reinforcement is required to evaluate materials and procedures developed in later projects.

Other procedures such as the detection of delamination in substructure components, and the measurement of chloride content and concrete permeability may be applicable. Developments such as determining the condition of asphalt-covered deck slabs, the effectiveness of sealers and the integrity of membranes will be used in evaluating the service life of existing methods of protection. This project will generate the information for determining the existing condition and predicting the future condition of concrete components which will be required as part of the development of the Time-Deterioration Model.

Projects 4-2 and 4-3 have essentially the same overall objective: to develop technically and economically viable options for protecting and rehabilitating existing concrete bridge components against corrosion. However, because of differences in technology, it is convenient to divide the research into electrochemical and non-electrochemical solutions to the problem. The treatment of members which were built without adequate corrosion protection, members which are chloride-contaminated but where the concrete is sound and those which are exhibiting corrosion-induced distress are specifically included in both projects. Rehabilitation is used to mean restoration to at least the original strength and dimensions of the component (though not necessarily with the same type of material) plus the provision of corrosion protection appropriate for the service environment and the future needs of the structure. The research products will be a range of cost-effective options for protecting and rehabilitating concrete bridge components. Some options will be more suited to certain components (e.g., piers rather than decks), others will require equipment and contractor expertise that may not be available in all areas and still others will be most applicable where there are operational constraints such as high traffic volumes or cold weather.

Project 4-4 is designed to bring together the products of the projects into a single usable form. It will develop a decision model which will be applicable at the project level as opposed to the network level. In other words, it will lead to the selection of the protection strategy which will result in the lowest anticipated life-cycle costs for a specified bridge based upon its existing condition and consideration of options for protecting its various components against damage. It will rely heavily on the products of the other three projects.

CEMENT AND CONCRETE

The Problem

The highway industry consumes 16 percent of the portland cement used for construction in the U.S., and its capital outlay for portland cement runs more than $1 billion annually. Two thirds of the short span bridges in the country are built of concrete. Portland cement is the most commonly used material for curbs, sidewalks and median dividers, and is frequently used for pavements, driveways and parking surfaces as well.

Despite its long and widespread use, the nature of this material and the hydration process are not fully understood. The extent to which residual moisture weakens the structure of hardened cement needs study. The gains in durability from additives such as fly ash, ground granulated blast furnace slag, and silica fume need to be examined.

Objectives

The primary goal of the research plan for cement and concrete is to increase service life through an improved understanding of the chemistry of cement hydration, the properties of concrete, and the performance of concrete in the highway environment. Particular attention will be given to understanding the mechanisms of setting and strength development, and the chemical processes during hydration and the cementitious component. Attention will also concentrate on improving the production, placement, quality control, durability and non-destructive testing of concrete. These research objectives will be addressed through four projects totaling $12 million:

5-1	Chemistry and physics of cement and concrete	$3,620,000
5-2	Durability of concrete	4,615,000
5-3	Quality control and condition analysis	1,720,000
5-4	Mechanical behavior of concrete	2,045,000

Project 5-1: Chemistry and Physics of Cement and Concrete: Better knowledge of how to control the microstructure and hydration of cement and concrete will help extend the service life of concrete. This project focuses on how the microstructure of fresh cement pastes, the chemistry of hydration of cements and pozzolanic reactions, and the chemistry of deterioration processes each affect the microstructure and properties of hardened cements and concrete. Improved test methods will be sought by replacing empirical relationships, when feasible, with mechanistic mathematical models derived from a correct understanding of the physical and chemical process involved. Attention is focused on the effects of hydration and pore structure and the distribution of the hydration reaction products rather than on the individual hydrated phases.

Project 5-2: Durability of Concrete: This project will develop means to increase significantly the durability and service life of concrete. Particular attention will be given to minimizing deterioration in existing pavements due to freezing and thawing, particular D-cracking, and alkali-silica reactivity, and to determining the moisture gradient in field concrete. It will also explore the mechanism of freeze-thaw damage and develop more definitive information on aggregates and entrained air-void criteria for enhancing durability when using water reducers and supplementary cementitious materials and admixtures. Part of the project will improve techniques for guarding against alkali-aggregate reactivity with a clearer understanding of the role of moisture condition of the concrete as influenced by environmental conditions. The project will also include developing a computerized expert system to provide diagnostic capability and solutions to durability problems.

Project 5-3: Quality Control and Condition Analysis: Non-destructive testing can play a significant role in improving quality control during construction. Such techniques can also be useful in evaluating the condition of existing structures, thus enabling necessary remedial measures to be taken. This project will develop a quality assurance system for acceptance, form stripping and placing in service based on existing and newly developed non-destructive tests. It will also develop an in-place permeability test for hardened concrete, and a test method and apparatus to determine the characteristics of the entrained air void system in freshly mixed concrete to facilitate acceptance or rejection before placement.

Project 5-4: Mechanical Behavior of Concrete: The mechanical behaviour of concrete during its exposure to traffic loads plays an important role in the performance of the pavement system. While much is known regarding the mechanical behaviour of most present-day concretes, relatively new developments in concrete technology may be of significance in improving the function and durability of pavement systems. Fiber reinforcement assists in mitigating cracking problems and high strength concrete allows for longer span bridges. To use these materials properly requires more information on the mechanical properties of such concretes. This project will explore the fatigue resistance and strain capacity of high-strength concrete subjected to repetitive loading. It will evaluate the properties of early high-strength concrete, and the influence of fly ash, ground granulated blast-furnace slag, silica fume and other cementing materials on the structural properties.

SNOW AND ICE CONTROL

The Problem

While elimination of snow and ice makes roads safer for motorists, the widespread use of salt has aggravated the deterioration of highways and bridges, especially those containing steel reinforcement. It causes motor vehicles to rust and may pose an environmental hazard, in soils and waterways near some roadsides where concentrations are exceptionally high. Snow and ice removal is also expensive: equipment and labour costs of winter maintenance programs exceed $1 billion each year.

Objectives

The objective of the snow and ice control studies is to provide more cost effective ways to prevent or remove the buildup of snow and ice on highways and bridges during winter conditions, reduce the deterioration of bridges, pavements and vehicles, and mitigate adverse environmental consequences of the use of snow and ice control chemicals. Five projects totalling $8 million have been identified in support of this objective:

6-1	Ice-pavement bond prevention	$2,100,000
6-2	Ice-pavement bond destruction	3,250,000
6-3	Improved displacement plows	1,200,000
6-4	Control of blowing snow	250,000
6-5	Management of snow and ice control operations	1,200,000

Project 6-1: Ice-Pavement Bond Prevention: Ice and refrozen compacted snow form an exceedingly tenacious bond to asphalt and portland cement concrete pavements. The nature of this bond and the mechanisms by which it develops are not clearly understood. Research on the fundamental chemical and physical structure and mechanics of bond formation may provide a basis for developing techniques and devices for interfering with or preventing bond formation without adversely affecting pavement properties such as friction. This project will explore chemical modification of the surface by incorporating chemicals into the pavement itself and through physical methods of surface modification, such as icephobic materials.

Project 6-2: Ice-Pavement Bond Destruction: Most present techniques depend on destroying the bond once it has formed, therefore there appears to be greater probability of success in developing new techniques, materials, and equipment to make significant improvements in ice removal. Key research tasks include fundamental studies of ice-substrate bond; physical surface modification (such as deformable or sacrificial surfaces); non-contact disbonding (e.g., microwave and laser radiation); contact disbonding (e.g., mechanical cutting, breaking); evaluation methodologies for deicing chemicals; and improvement of sodium chloride as a deicer.

Project 6-3: Improved Displacement Plows: U.S. plow designs have evolved empirically with scant attention paid to the physical properties of the material being handled and with little consideration given to the aerodynamic and hydrodynamic principles involved in the flow of fluidized snow. As a consequence, the energy expended in displacing snow is disproportionate to the work performed and low cast distance requires unnecessary rehandling of snow. The plow research will establish design criteria and prepare design details and specifications for displacement plow systems based on aerodynamic/hydrodynamic principles, material handling characteristics of snow, and ice cutting mechanics. The project will lead to standard designs for plows for different types of snow and climatic conditions.

Project 6-4: Control of Blowing Snow: Snow fences and other means of reducing the amount of snow reaching a roadway help cut the costs of snow clearing, reduce the formation of compacted snow, and reduce the need for chemicals. The study will develop criteria for properly designed snow fences installed in the proper location to control wind-blown snow in many situations. Considerable progress has been made in the engineered design of snow fences over the last few years, yet more remains to be done to increase their effectiveness in a diversity of conditions. It may be possible to improve the effectiveness of snow fences through research on free-turbulent mixing in the vicinity of barriers to allow prediction of surface shear stress. Proper design of roads, overpasses, guard rails, and vegetation to prevent many severe drifting situations also will be studied.

Project 6-5: Management of Snow and Ice Control Operations: Snow and ice control is the single most costly maintenance function performed by many northern states and cities. This study will identify and evaluate alternative means of sensing and communicating road and bridge conditions to the maintenance organization to reduce response time of maintenance crews and to provide maximum public awareness of road conditions.

STATUS

We are close to an important milepost on the path of progress for the Strategic Highway Research Program. The Final Report for the study design has been published. An institutional arrangement to house the SHRP management team under the National Research Council of the National Academies where it will operate as a sister agency to TRB is being implemented.

The pre-implementation phase which began in October 1984 is nearing completion. It covered the SHRP office activities, five research design study contracts and the overview study contract. The sixth research design study for long term pavement performance has been funded by FHWA.

We have begun to move this program from a planning effort to an active research effort. In order to keep the program moving and be ready to award contracts it was necessary to begin building a staff, conduct meetings with the States on pavement test section selections, and prepare for the initial research projects to be contracted.

The full program, where research is underway, is proposed to be funded at a level of $30M per year for five years. The source of funds is to be through the setting aside of 1/4 of 1% of the Federal-Aid highway construction money. This provision is intended to be incorporated in the next highway appropriations bill to be considered by the 1986 Congress. The current legislation expires on September 30, 1986. The administration and the Congress have indicated support for the SHRP research set-aside provisions in draft highway funding legislation. We continue to be confident that SHRP will be funded and the active research phase will be underway on October 1, 1986.

SUMMARY

That's the status report and a glimpse of the immediate future as well. It's an exciting picture and full of promise. We are launching the greatest surge in highway research that this nation has ever witnessed. The benefits to all of us will be immeasurable. Let me close by suggesting three good reasons why we should all support this program wholeheartedly.

First, there is great intrinsic value in the program. It responds to some long-neglected needs for improvements in basic technologies and materials serving our street and highway systems. The potential payoffs can return the investment we'll make a hundred fold in just 25 years.

Second, its a new, additional, supplemental program - not intended to supplant any on-going research activities. As a new program, with an accelerated, highly-focused, results-oriented thrust, it can demonstrate the pay-offs from research and serve as an example to encourage other new research investments.

Third, the research planning process will not end with the final reports. We must develop a plan and we must work to that plan, but we must continue to reassess and reevaluate that plan throughout the program. The early results of parts of the research effort will influence the latter stages of the plan. The successful management of SHRP must be a dynamic process with a clear and steady vision of the program goals and an open, responsive approach in finding the path to those goals. We hope you will continue to be a supportive, constructive part of that process.